

## PART II

### SECTION 6 WATER DISTRIBUTION

#### A. MATERIALS:

##### 1.01 Mains

- A. The City of Miami Beach Public Works Department does not permit the use of 10-inch, 14-inch or 18-inch pipe, fittings or valves, except as may be approved for connections to existing mains. The minimum distribution line size is 8 inch diameter.
- B. Ductile Iron Pipe (D.I.P.) restrained joint pipe Class 52, as manufactured by U.S. Pipe or American Pipe (or approved equal) in accordance with ANSI standard A21.51 working pressure not less than 250 pounds per square inch. The inside lining of the pipe shall be cement mortar as per ANSI Standard A21.4 and AWWA C 104. The outside coating shall be an asphaltic coating approximately one mil thick as specified in AWWA C151. All pipe and fittings shall be poly-wrapped conforming to the requirements of ANSI Standard A21.5 and shall have an 8 mil minimum thickness.
- C. D.I.P. rubber gaskets and lubricant shall conform to the applicable requirements of ANSI Standard A21.11
- D. PVC pipe shall be ASTM 1120 pressure pipe with iron O.D., Class 150 (DR 18), conforming to ANSI/AWWA C-900 or C-905, latest revision. The pipe shall be impregnated with blue pigment and utilize push on rubber gasketed joints. PVC pipe shall be installed in accordance with the Uni-Bell Plastic Pipe Association's Guide for Installation of PVC Pressure Pipe for Municipal Water Distribution Systems.

##### 1.02 Fittings and Appurtenances for Mains

- A. Cast iron-ductile fitting and appurtenances shall be 250 PSI pressure rated
- B. Fittings and appurtenances shall be cement mortar lined in accordance with ANSI Standard A21.4. The exterior of fittings and appurtenances shall be coated with an asphaltic coating approximately one mil thick, per AWWA C151 latest revision.
- C. Pipe minimum wall thickness shall be Class 52 for 6" diameter and larger.

##### 1.03 Valves

- A. Butterfly valves shall be used on water mains larger than 12" Diameter:
  - 1. Shall be AWWA Class 150B.
  - 2. Shall be designed for installation in horizontal pipeline with operating shaft in a vertical position. Butterfly valves shall conform to ANSI/AWWA C504 latest revision.
  - 3. Shall have torque limiting device.
- B. Gate valves shall be used on mains 3" diameter to 12" diameter.
  - 1. Shall be designed for a working pressure of not less than 200 pounds per square inch with fully resilient seat and conforming to ANSI/AWWA C 504 latest revision.
  - 2. Shall have a disk on top of the operating nut, specifying number of turns and direction to open.
- C. Valves on 3 inches and smaller lines:
  - 1. Shall be bronze with double disc, non-rising stem, and open left (counter clockwise) with operating wheel. Pewter and pot-metal operating wheels shall not be permitted shall be all bronze
  - 2. Shall conform to Fed. Spec. WW-V-54, Type I, Class B

##### 1.04 Valve Boxes

- A. Cast iron boxes shall be extension type with slide-type adjustment and flared base. The minimum thickness of metal shall be 3/16 inch. The word "W" shall be in the cover. The boxes shall be of such length as will be adapted, without full extension, to the depth of cover required over the pipe at the valve location. Boxes to be No. 3 for 6" and larger lines

#### 1.05 Fire Hydrants

- A. All Fire Hydrants to be manufactured by American Darling Model B-84B-5 with threaded pattern. The nozzle sizes shall meet City of Miami Beach Fire Department requirements.
- B. Reused Fire Hydrants are to be less than 10 years old. New Fire Hydrants are to be of current year's manufacturer.
- C. Contractor should inspect and verify that threaded equipment and couplings are compatible with City equipment, particularly "Hose Threads".

#### 1.06 Water Service and Fire Lines

- A. All service lines two inches (2") in diameter shall be polyethylene tubing, conforming to AWWA C-901, ASTM D2239 and AASHTO 294 latest revisions. Polyethylene services crossing a pavement and connecting to a water main in the swale area shall be installed within a four inch (4") diameter black iron sleeve pipe, under the pavement and sidewalk.
- B. Copper or brass piping is not allowed except for special conditions. Use threaded pipes or compression fittings. No solder joints allowed.
- C. Ductile iron pipes less than 6" diameter shall be class 53.
- D. Tapping Saddles shall have two (2) stainless steel straps and one Corporation Stop.
- E. Meters shall be supplied, installed, replaced and/or maintained by the City.
- F. Meter boxes are to be supplied by the contractor in accordance with City's specifications.

#### 1.07 Double Detector Check Assembly (DDCA)

- A. Install double detector check assembly (DDCA) in accordance with AWWA M14, latest revision.
- B. Structures directly supplied from public water mains with an auxiliary water supply dedicated to Fire Department use and available to the premises shall be protected from the Public Water Supply System by back-flow prevention assembly (RPBA) with RPZ.
- C. The Double Check Valve Assembly (DCVA) and the Reduced Pressure Principle Backflow Prevention Assembly (RPBA) shall be installed above the flood plane elevation.
- D. All above grade piping shall be copper or D.I.P. No P.V.C. or galvanized pipes are allowed.
- E. Back flow prevention devices shall be equipped with proper vertical support and security.

### **B. INSTALLATION**

#### 1.01

- A. All ductile iron pipes shall be installed true and straight in accordance with ANSI/AWWA C 600 latest revision. Allowable pipe deflection shall not exceed 50% of the maximum deflection, as recommended by the pipe manufacturer.
- B. Detector Tape: All pipes shall have 3" wide blue detector tape for water main. The words "CAUTION WATER LINE BURIED BELOW" on the upper side of the pipe shall be printed at 30" intervals along the tape. Tape shall be placed 18" below grade above all water mains and services or as recommended by manufacturer. Non-metallic tape shall be used above ductile iron pipe. All PVC Mains shall be installed with a 14 gauge multi-strand copper wire locator system compatible

with the Schonstedt MAC-51Bx pipe and Cable locator, or City approved equal. Wire to be strapped to pipe at maximum 10ft. intervals and the wire is to be brought up at each valve box, leaving and excess length of four (4) feet of wire coiled at each valve. At the water main pressure test, a continuity test shall be performed by the Contractor. The Continuity test shall be witnessed and approved by the City's Representative and Engineer-of-Record.

- C. Bedding and initial backfill shall be in accordance with approved City of Miami Beach detail.
- D. Ductile Iron Pipe and PVC pipes shall be laid with minimum vertical cover of 36 inches below finished grade, on City and FDOT roads. The minimum vertical cover over Ductile Iron and PVC pipes on Miami-Dade County roads shall be 48 inches.
- E. Minimum water service pipe to be installed from the water main to the meter is to be a two (2) inch diameter polyethylene line. Polyethylene water service line connections to the water main (both for new and existing water mains) shall be VIA a double strap stainless steel saddle with corporation stop. Ductile iron pipe service and fire line connections (three (3) inch and larger) to existing water mains shall be VIA a tapping saddle and valve, with the valve contained in a valve box. Ductile iron pipe service and fire line connections (three (3) inch and larger) to new water mains shall be VIA a tee and a gate valve, with the valve contained in a valve box, on the branch line off the water main.
- F. Pipe and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other authorized equipment. Under no circumstances shall any of the water-line materials be dropped or dumped into the trench. All pipe, fittings and accessories shall be encased in Polyethylene tubing ( 8 mil) thick.
- G. Care shall be taken to avoid abrasions of the pipe coating. Except where necessary in making connections with other lines, pipe shall be laid with the bells facing in the direction of laying. Defects in coating are to be field repaired.
- H. The full length of each section of pipe shall rest solidly upon the completed pipe bed, with recesses excavated and shaped to accommodate bells, couplings, and joints. Pipe that has the grade or joint disturbed after laying shall be taken up and re-laid.
- I. Water main connection shall not be made to the City's main unless water in the trench at the connection point is at least 6" below the bottom of the pipe. When work is not in progress, open end of pipes, fittings, and valves shall be securely closed with polywrap or Filter Fabric so that no trench water, earth, or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the Contractor shall repair the damaged coating or lining in a satisfactory manner at his expense. Pipe ends left for future connections shall be valved, plugged or capped, and properly restrained.
- J. City oversees connection between the old and new pipes and makes all wet taps on existing piping. Size to size taps is not allowed unless approved by the City Engineer. Tapping sleeve glands shall be tested and pass a pressure test of 120 psi for 2 hours before the pipe is tapped.
- K. City to make all wet taps on existing piping and operate all existing valves.

## 2.02 Restraining

- A. All pipes shall be internally restrained. Pipe to fitting, valves and accessories shall be by internal restraining and external stainless steel restraining rods for the first joint. Thrust blocks are not allowed unless specially approved by Public Works Engineering in writing.

- B. All fittings and specific pipe joints shall be restrained as outlined below (NO SUBSTITUTIONS):

<u>JOINT</u>	<u>RESTRAINT</u>
Push-On PVC	EBAA Iron Series 2800 Harness
Push-On DIP	TR-Flex by U.S. pipe or Flex Ring by American; or EBAA Iron Series 1700 Megalug
Fitting with DIP pipe	EBAA Iron Series 1100 Megalug
Fitting with PVC pipe	EBAA Iron Series 2000 Megalug

## 2.03 Setting of Valves and Boxes

- A. Install where shown or specified, and set plumb. Valve boxes shall be centered on the valves and set plumb at finish grade. Boxes shall be installed over each gate valve unless otherwise shown.
- B. Where feasible, valves shall be located outside the area of roads and parking. Earth fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet.
- C. There shall be a valve at all branches tees and crosses except fire hydrants and fire lines. Valve shall have the top of the operating nut located at maximum of 12" below the finished grade.
- D. Valve boxes shall have a 12"x12"x8" reinforced concrete slab surrounding it, on paved areas at grade, and in swale areas 4" below grade for placement of sod over the slab.

## C. FLUSHING TESTING AND DISINFECTION

- A. Upon completion of the installation, the water main shall be thoroughly canon flushed through a riser. The water shall be properly disposed not to cause a flooding problem. All water used must be metered through a City supplied construction meter. The contractor can obtain the meter through proper application and payment of the required fee at the City's Public Works Department.
- B. The complete water system shall be pressure tested and disinfected. The pressure test shall be for two hours at 120 psi minimum test pressure in accordance with ANSI/AWWA C600-93 latest revision. No more than 5 psi drop over the length of test. Final approval will be based on leakage test results. The maximum allowable leakage shall be determined by following formula:

$$\text{AWWA Formula: } L = \frac{SD \sqrt{P}}{133200}$$

Where: D = Pipe Diameter in inches  
 S = Length of lines in lineal feet  
 P = Average test pressure  
 L = Allowable leakage for system in gallons per hour

The pressure test shall be witnessed by a representative of the City of Miami Beach, Public Works Department and the Engineer of Record or his representative.

- C. Disinfection:
  1. Advance notice is to be provided to the City of Miami Beach Public Works Department and the Miami-Dade County Department of Health. Bacteriological sampling points shall be provided at the location shown on the plans or as directed by the Department of Health, and paid by the contractor.
  2. All Pipe lines shall be disinfected after they have been pressure tested and while still full of water, as specified in AWWA standard C601 latest revision and Miami-Dade County Health

Department procedures.

3. A suitable chlorinator shall be used to inject chlorine into the lines. All connections required for the introduction of chlorine into the water lines shall be made by the Contractor. Chlorine and water shall be introduced at one end and shall be allowed to flow slowly through the lines to the other end where it shall be removed and disposed of at the Contractor's expenses. Several points of introduction and removal of chlorine solution may have to be employed to get an even distribution through the entire section being disinfected.
4. The quantity of chlorine introduced shall be such as to insure a concentration of at least 50 parts per million in the water flowing from the line.
5. The chlorine solution shall be allowed to stand in the line for at least 24 hours or longer, if required, to destroy all harmful bacteria. At the end of the required time, the concentration of chlorine in all parts of the section shall be at least 25 ppm.
6. All valves and appurtenances in the section shall be operated at least once during the above period. After the required period, the treated water shall be thoroughly flushed from the section and the system filled with potable water.
7. The Contractor shall be responsible for coordination with Miami-Dade County Department of Health, who shall collect and test samples from main. The Contractor shall provide assistance to the Dept. of Health for the collection of samples. The samples shall be taken from each main or section of main to be placed in service where designated by the Dept. of Health. The samples must be approved by the Department of Health before the main is placed in service.
8. The Contractor shall be responsible for any rechlorination, retesting and fees that may be required until the Department of Health's approval is obtained. The Contractor shall be responsible for the disposal of all water flushed from the system and shall safeguard all adjoining properties from damage from flooding. The Contractor shall exercise due care in the protection of private property from water damage due to his operations. In addition, the Contractor shall assume complete liability for any damage which was directly or in-directly caused by his operations.
9. All of the connections shall be disinfected by the contractor.
10. The inside of each pipe and fitting laid by the Contractor in connecting to existing mains which are isolated from the main by valves shall be swabbed with calcium hypochlorite, HTH, Perchloron, or approved equal, mixed in solution with water. The quantity of hypochlorite shall in all cases be subject to the approval of the City of Miami Beach Public Works Department, Operations Division, whose representative shall be present at all times while this phase of the work is in progress.
11. Wherever practicable, water from the existing mains flowing through the disinfected connections shall be used in disinfecting the main line in order that the hypochlorite may be removed to the greatest extent possible. In other cases, the water from the disinfected connections shall be removed by allowing it to flow into the main line as it is being drained.
12. No pipe shall be placed in service until it has been disinfected as approved by the Engineering Division City of Miami Beach and certified by the Department of Health including certified as-built drawings accepted by the City.

#### **D. SPECIAL CONSIDERATIONS**

- A. Water lines shall not be laid in the same trench with sewer lines, storm sewer, gas lines, fuel lines, or electric cables. The horizontal and vertical separation shall be in accordance with the Department of Health (HRS) latest revision.

- B. The existing water main network shall be analyzed during the design to determine which mains can be abandoned and taken out of service during the construction of water mains. Mains to be abandoned shall be left in place and are to be cut and capped to the nearest valve.
- C. The cost of tests including water usage and retesting due to failures shall be at the contractor's expense.

4.02 As Built Drawings, Information:

Prior to final acceptance, two (2) copies of as-built drawings certified by a Florida Registered Land Surveyor shall be provided to the City for approval, acceptance and certification by the "engineer of record", together with a copy of digital media producing such As-Builts. At minimum, the As-Built must show Station numbers and horizontal offsets from the Base Line and Right-of-Way lines on a Plan scaled 1"=20 ft. for all fittings, valves and changes in horizontal alignment, and a profile with a vertical scale of not less than 1" = 2 ft. with elevations at all horizontal and vertical changes in alignments and grade profile elevations at approximately 50 ft. As-Built Plans and Profiles must also show all abandoned pipes and plugs that were modified within the project limits and actual elevation/description of all other utilities crossing or encountered in the vicinity of the new water mains. The paper size of the drawings shall be 22"X 34".